area was overflowed; the Lima levée, south of Meyer, broke on the 24th, and north of Meyer on the 26th, the water overflowing hundreds, and perhaps thousands of acres of land, much of which was in wheat and oats. Long Island, near Quincy, was overflowed, and stock was taken off by boats on the 26th. There were also large areas overflowed in the Fabius Valley. Most of the residents of Bay Island moved to the mainland on the 27th, nearly all of the islands being then under water. On the night of the 27th the boathouse at Hannibal was almost surrounded by water, and some cellars were flooded.

It was estimated that 15,000 to 20,000 acres of land between Hannibal and Quincy was overflowed, and also 30,000 acres opposite Louisiana, Mo.

The damage from this flood consists largely of washing out new levee work, causing to the contractors the delay and expense of moving to highland and return.

Wheat on the overflowed lands was not much injured; it was already in poor condition, and the water left it before doing much damage.

In East St. Louis and vicinity the high water occasioned considerable inconvenience and some alarm for a few days, but no material damage was done.

A moderate flood in the Pittsburg district on the 1st and 2d was well covered by preliminary warnings, and no damage resulted, except the flooding of cellars and the covering of some railroad tracks.

In the lower Ohio and its tributaries, the flood, which was quite marked, was made the subject of the following report by Mr. P. H. Smith, Official in Charge, United States Weather Bureau office, Cairo, Ill:

The first important rise in the lower Ohio River during the present spring occurred at Evansville from March 5 to 14, inclusive. The stage of water reached on that rise was 36.2 feet. The river commenced falling on March 14 and continued falling until the 23d, when a second rise started in, which crested at 39.3 feet at 9 a. m., March 31. The river remained stationary at that stage until some time during the evening of April 1, when it again began to rise slowly and continued rising until the morning of April 3. The highest stage reached was 39.8 feet. The river commenced to fall on April 4, and passed below the danger line at 9 p. m. of April 10.

The official in charge at Evansville was advised by wire on the morning of March 26, when the river at that point was 31.3 feet, that the danger-line stage of 35 feet would be reached within thirty-six hours. The exact time was 4 p. m., March 27. On this date the official at Evansville was further advised that the maximum stage at that place would be between 39 and 40 feet. These warnings were disseminated as widely as possible. The official in charge at Evansville in reporting upon the flood states:

"All river interests were given timely notice in regard to the maximum stage expected. While the high water caused more or less inconvenience by submerging some parts of the roads in the bottom lands, and will also somewhat delay spring plowing, no direct damage can be attributed to it in this vicinity."

The rise during the first half of March at Paducah and Cairo caused only a moderate tide. The river commenced falling at Paducah on the 17th and at Cairo on the 18th. Another rise set in at Paducah on the 24th, which crested on April 4 at 44.7 feet. The fall set in on the morning of April 5, and the river passed below the danger line of 40 feet during the night of April 10–11.

At Cairo the river commenced rising again on March 24, reached 49.1 feet on the morning of April 5, commenced falling by the afternoon of April 5, and passed below the danger line of 45 feet on April 13. The maximum stage forecast for Cairo was 48.5 to 49.0 feet. The remarkably high stage at Cairo, considering the moderate floods out of the upper Ohio and the southern tributaries of the lower Ohio, was due in part to torrential rains over southern Illinois during March 24–25.

No material damage resulted from the flood in the vicinity of Cairo. Railroad traffic at Birdspoint, Mo., across the river from Cairo, was interfered with for a short period. Lowlands were flooded and wheat damaged somewhat. The damage to wheat will not, however, exceed 10 per cent unless later floods follow. At Birdspoint about 40 per cent of the lowland behind the Cotton Belt tracks and the levees were submerged. This is the smallest amount of land ever submerged at so high a stage of water in this vicinity.

The flood in the lower Tennessee Valley was not of much importance. Warnings were sent out well in advance of the flood and no damage was done that could have been prevented by warnings. At Florence the river reached a maximum stage of 17.2 feet on March 27–28. At Johnsonville the maximum stage reached was 28.1 feet on March 29. Warnings issued to points on the lower Tennessee were bulletined and distributed by mail. Lumber and cross-ties were the principal properties protected. The observer at Florence estimates that property in that vicinity valued at about $40,000 was protected, but states that there was practically no danger.

The most damaging flood occurred in the lower Wabash. A rise during the early part of March brought the stage at Mount Carmel up to 19.7 feet on the 14th. This rise caused little or no damage. The river fell to 15.5 feet by the morning of March 21, when a second rise began which crested at 27.1 feet on April 2. The river commenced falling by the morning of April 3 and passed below the danger line (15 feet) on April 17.

Warnings were telegraphed to Mount Carmel and several other points affected, and distributed from those points to other river towns. The maximum stage forecast for Mount Carmel was 28 feet. The maximum stage reached was 27.1 feet. The river at Mount Carmel would probably have reached 28 feet, or higher, had not some of the levees in that section given way.

Reports from the flooded Wabash district show that the warnings were of great value. The observer at Mount Carmel reports that, on account of the warnings, farmers had time to remove their families and stock.

Mr. Henry Johnson, of Owensville, Ind., reports as follows:

"Relief parties were sent out to the flooded districts, and telephone messages giving warnings of danger were sent to all neighborhoods. Many relief parties were sent out in boats to remove people and stock to places of safety. The warnings enabled us to save most all property exposed to danger.

The rivers of the Pacific States were moderately high during the month, but the situation developed nothing of particular interest.

The last ice of the season in the Mississippi River was reported at Prairie du Chien, Wis., on the 2d. On the 26th the first boat of the season arrived at St. Paul, coming from Wabasha, Minn. In the Missouri River the ice moved out at Williston on the 4th and 5th, and at Bismarck, N. Dak., on the 6th. The last ice of the season passed Sioux City, Iowa, on the 12th, and Omaha, Nebr., on the 13th. At Pierre, S. Dak., local navigation for the season was opened on the afternoon of the 10th. The Penobscot River opened on the 8th. No ice was reported from any other river of the Atlantic system.

The highest and lowest water, mean stage, and monthly range at 201 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, District Forecaster.*

CLIMATE AND CROP SERVICE.

By Mr. JAMES BERRY, Chief of Climate and Crop Service Divison.

The following summaries relating to the general weather and crop conditions during April are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau; they are based upon voluntary reports from meteorological observers and crop correspondents, of whom there are about 3000 and 14,000, respectively:

Alabama.—Dry, cool month, favorable for work, but unfavorable for germination and growth; local damage by frost and hailstorms. Cotton made generally poor stands; considerable not up, much replanting in progress. Upland corn made slow growth; planting of lowland corn retarded by dry, hard soil. Wheat and oats heading low during last decade, when all minor crops were backward; strawberries yielded well; fruit prospects continued good, except in some northern and western counties.—*F. P. Chaffee.*

Arizona.—Generally dry weather, with high, drying winds, and at times abnormally low temperatures, accompanied, except in the warmest sections, by light to killing frost, prevailed during April. In the lower Colorado Valley, where irrigation water was abundant, crops made fine growth. In the other parts of the Territory, however, crop conditions were generally very poor, and considerable injury to fruit, as well as other crops, resulted from frost. Range feed and stock water were scarce and stock suffered greatly.—*M. E. Blystone.*

Arkansas.—Cool temperatures with early excessive rains delayed farm operations and were unfavorable for germination. Cotton planting progressed slowly; the early planted came up to only a fair stand and replanting was necessary in some sections. Corn planting was well advanced by the close of the month; the stand was irregular and there was some replanting. Small grains and gardens made slow growth. Peaches

and apples deteriorated slightly, but good yields were indicated. Berries were late but abundant.—*Edward B. Richards.*

California.—Nearly normal weather prevailed during the month, excepting the abnormally high temperature on the 10th and 11th. No material injury to crops resulted from the heat, and the frequent showers were very beneficial. Deciduous fruits escaped damage by frost this season, but some varieties were injured by the continued cool, wet weather in February and March. Oranges were in bloom by the 15th in the Sacramento Valley and southern California. Wheat prospects were improving toward the close of the month.—*Alexander G. McAdie.*

Colorado.—Seeding advanced favorably, except in dry localities; sugar beets were mostly planted, and the planting of corn, potatoes, melons, and gardens progressed satisfactorily; alfalfa backward; eastern ranges practically dormant. Fruits were slightly injured by frosts. Snowfall considerably below normal; less than usual flow indicated for latter part of season, although average flow probable for May and June from localities in central mountain districts.—*F. H. Brandenburg.*

Florida.—Dry weather and cool nights retarded germination and growth generally. Early cotton pushed forward slowly and late planted germinated unsatisfactorily; much replanting was necessary, which was delayed; general prospects only fair. Corn advanced fairly well, though growth on upland showed need of rain; some fields turned yellow. Citrus trees lost considerable fruit owing to drought and red spider. The pineapple crop will be short. Cane, vegetables, and minor crops did well.—*A. J. Mitchell.*

Georgia.—A cool, dry, and generally disagreeable month. The average precipitation was the lowest on record for April. At the close of the month drought prevailed in all sections and crops were backward. Growth of cotton was slow; poor stands; many fields plowed up and replanted; seed scarce; no decided increase in acreage. Indicated yield of peaches largest in many years, but fruit in about fifteen northern counties was killed on the 4th and 5th by frost.—*J. B. Marbury.*

Idaho.—The month was somewhat warmer than the average, with precipitation generally deficient. Snow in the mountains melted rapidly, resulting in unusually high water in streams. Vegetation made satisfactory growth. A large acreage was prepared for sugar beets and a considerable amount of beet seed was planted. Stock was turned on the range and made good gains. A good clip of wool and a good percentage of lambs reported—*Edward L. Wells.*

Illinois.—The weather was unseasonably cold and vegetation made slow growth. The sowing of oats, begun during the first decade, was practically finished at the end of the month. Plowing for corn was well advanced by the 25th, under favorable conditions. The fruit prospect was generally promising, except for peaches.—*William G. Burns.*

Indiana.—Bottom and flat lands were too wet to work, and, with the exception of two or three brief periods, the month was unseasonably cold. Prospect for wheat was poor; during last of month large acreage plowed up. Rye and old clover was fairly promising. Peaches dead in many localities and generally only a light crop was indicated; other fruit prospects fair to excellent. Plowing for corn, planting potatoes, making gardens, and preparing ground for tomatoes, peas, and sweet corn were under way.—*W. T. Blythe.*

Iowa.—This was the coldest April of which we have records covering all districts of the State. The precipitation was above normal, but there was sufficient clear weather to give opportunity for seeding wheat, oats, and barley in fairly good season. Considerable progress was made in preparing ground for corn planting, and rather more than the usual area was in readiness by the close of the month. Vegetation and fruit bloom were unusually late.—*John R. Sage.*

Kansas.—Cold month; dry first half, abundant rains latter half. Wheat improved materially; soft wheat began heading in south last week. Corn planting continued; early corn came up in southern counties the latter part; some cultivated the last week. Cool weather retarded growth of oats and prairie grass, but alfalfa grew rapidly. Early apples and peaches bloomed; the apples and seedling peaches gave very good promise—*T. B. Jennings.*

Kentucky.—Cool, wet weather retarded farm work and delayed germination of seed and growth of plants. Wheat, oats, and grass made very little progress. Corn planting was not half completed and what was planted came up very slowly. Tobacco plants were very small, but healthy. Gardens and truck crops were very backward. Severe frosts on the 17th and 21st damaged fruit very seriously. Pastures were late starting and stock not in very good condition.—*S. P. Gresham.*

Louisiana.—Weather favorable for outdoor work. Cotton planting progressed rapidly, but low temperature in central and north portions retarded germination and growth; some replanting necessary; cultivation kept pace with growth of plant. Sugar cane and rice did well, but needed warm, showery weather. Corn looked sickly over the north portion, but was healthy over the south portion and being laid by. Truck gardens did well. Oats were heading. Irish potatoes of excellent quality were giving good yield.—*I. M. Cline.*

Maryland and Delaware.—Poorly distributed rainfall made much ground too wet to work during the first decade and again during the last week. Work progressed rapidly from the 10th to the 25th. Wheat made great improvement, but was below normal. Grass afforded little pasture. Oat seeding was general the first half of the month and good stands resulted. Some corn was planted the last decade. All fruits, except peaches, bloomed profusely and promised large yields. Peas did well.—*Oliver L. Fassig.*

Michigan.—April was cold and the rainfall poorly distributed. All vegetation very backward. Plowing was not generally begun until about the 20th; early oats, early potatoes, and barley were seeded in the southern and central counties during the last decade. Fruit buds at the close of the month were very small. Winter wheat, rye, meadows, and pastures were in poor condition, wheat being particularly bad. Early seeding germinated very slowly on account of the dry, cold condition of the soil.—*C. F. Schneider.*

Minnesota.—Temperatures were low till the end of the month. Heavy snow was general on the 7th and 14th. No seeding in the Red River Valley during the month, while that begun early on high light lands in central and southern sections was much hindered till the last week, when wheat and oat seeding was nearly finished, and barley seeding was begun, with preparations going on for flax, barley, potatoes, and corn; grass growing slowly.—*T. S. Outram.*

Mississippi.—Planting was about completed, but germination and growth were much retarded by unseasonably cool weather. Generally good stands of early corn were secured and cultivation was in progress south, but late plantings came up slowly. Considerable early cotton was up to fair stands and being chopped south, but very little appeared above ground in the north. Oats did well. Cane came up to fairly good stands. Strawberries and vegetable crops were yielding well and tree fruits were generally promising.—*W. S. Belden.*

Missouri.—The month was colder than any previous April during the past seventeen years. Over a considerable portion of the State the precipitation was excessive, causing destructive floods. These conditions were generally unfavorable for work and growth. In some southern counties fair progress was made with corn planting, but much corn rotted in the ground. Wheat continued to improve but made slow growth, as did also oats and grasses. The outlook for fruit, except peaches, was very promising.—*A. E. Hackett.*

Montana.—Mild temperature the greater part of the month; precipitation decidedly below normal. Plowing commenced about the 10th and seeding about the 15th, and were well advanced in certain counties by the close of the month. Range grass made fair growth by the third week and cattle and sheep noticeably improved. Winter wheat and rye made good start and early sown spring wheat and oats were coming up during the last week.—*R. F. Young.*

Nebraska.—Low temperature and generally deficient precipitation retarded growth. The soil was generally in good condition, and spring wheat and oats were sown early and plowing for corn progressed unusually fast. Very little corn was planted. Winter wheat started nicely, except in western counties, where it was damaged by dry weather. Grass started very slowly. Fruit trees were in blossom and very promising the last week, and oats and spring wheat were up nicely at close of month.—*G. A. Loveland.*

Nevada.—Temperature and precipitation averaged below normal. Forepart of month mild and favorable for farming operations, latter part unseasonably cold with heavy frost, which damaged fruit buds in southern and western districts. Plowing and seeding progressed rapidly in all districts, but the weather during the latter part of the month was much too cold for germination and growth.—*J. H. Smith.*

New England.—Cold weather and heavy precipitation were very unfavorable to all farm operations. and also to crops, although grass and winter grain were generally in fairly good condition. The month closed with several days of pleasant weather, during which much plowing and some garden planting were done. The season was ten days to two weeks late. Excepting peaches, which were greatly damaged by the cold, fruit buds were reported in favorable condition. The maple sugar crop was good.—*J. W. Smith.*

New Jersey.—Low temperature and badly distributed rainfall greatly retarded work, germination, and growth. Frequent killing frosts occurred, the last for the month on the morning of the 23d, when ice formed in many places, but did no serious injury. At close of month the blossoming of fruit trees in southern and central sections was fully two weeks later than usual. In those sections the planting of potatoes and seeding of oats was completed before the month closed.—*Edward W. McGann.*

New Mexico.—The protracted drought remained practically unbroken, excepting in the extreme northeastern section. Stock suffered severely, and many cattle died on southern ranges. Early lambing almost a complete failure in many localities on account of the cold nights and lack of green grass for the ewes. Farm work generally remained at a standstill. Early fruits, as apricots, peaches, and cherries, suffered greatly from frosts, winds, and drought.—*R. M. Hardinge.*

New York.—Winter severe and spring unusually late. April cold and unseasonable and all farm work very backward. Wheat and rye suffered from the cold winter, and grass was considerably damaged. Peaches were largely killed and pears were damaged in places, but other fruit was considered safe April 30. The season was favorable for making maple sugar.—*R. G. Allen.*

North Carolina.—The month was very cool and dry. Farm work progressed rapidly, but germination and growth were slow. The frequent

SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS, APRIL, 1904.

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.							Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.					Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	60.0	— 3.4	Thomasville	89	1	Livingston	28	5	2.22	—2.17	Oneonto	4.65	Camp Hill	0.43
			Newbern	89	24									
Arizona	61.9	0.0	Gila Bend	108	26	Grand Canyon	10	1	0.01	—0.30	Flagstaff	0.11	43 stations	0.00
Arkansas	58.6	— 4.8	Jonesboro	89	23	Pond	24	10	3.88	—0.35	Amity	7.94	Dardanelle	1.64
			Ozark	89	23									
California	57.2	— 0.5	Indio	110	26	Bodie	— 4	20	2.18	+0.29	Pino Grande	9.25	8 stations	0.00
Colorado	44.5	+ 0.7	Delta	90	27	Whitepine	— 3	7	1.03	—0.45	Yuma	3.37	Conejos	0.00
Florida	68.3	— 0.4	Ocala	95	2	Macclenny	38	14	1.71	—0.64	Eustis	3.88	Marco	0.36
						Marianna	38	14						
						Middleburg	38	9						
Georgia	59.7	— 3.6	Mauzy	93	16	Clayton	23	5	1.63	—1.96	Diamond, Rome	3.18	Savannah	0.35
Idaho	46.0	.....	Blue Lakes	91	13	Lake, Paris, Soldier	0	1	1.24	.....	Grangeville	2.40	Albion	0.25
Illinois	46.7	— 5.4	Bushnell	87	23	Dixon	13	21	3.76	+0.50	Carrollton	7.34	Martinsville	0.95
Indiana	46.8	— 5.3	Rome	87	23	Angola, Markle	18	20	3.32	+0.14	Greencastle	5.87	La Porte	1.37
						South Bend	18	20						
Iowa	44.1	— 5.2	Forest City	86	23	Primghar	13	11	3.63	+0.74	St. Charles	8.97	Elkader	1.52
			Sigourney	86	22									
Kansas	50.9	— 4.9	Englewood	92	13, 21	Larned	15	8	3.61	+0.91	Fort Scott	10.34	Ulysses	0.60
Kentucky	50.8	— 5.2	Cadiz	85	23	Middlesboro	16	21	2.83	—0.97	Catlettsburg	4.30	Highbridge	1.90
Louisiana	62.9	— 1.9	St. Francisville	92	20	Robeline	30	17	3.05	—1.47	Oxford	6.45	Port Eads	1.15
			Schriever	92	21									
Maryland and Delaware	49.1	— 2.7	Cambridge, Md	87	25	Deer Park, Md	10	4	2.46	—0.95	Denton, Md	4.10	McDonogh, Md	1.29
Michigan	38.1	— 5.3	Berrien Springs	83	23	Thomaston	— 8	3	2.10	—0.15	Arbela	4.71	Chatham	0.49
Minnesota	38.8	— 4.8	Winona	82	30	Tower	3	1	1.72	—0.73	Moorhead	4.62	Milaca	0.24
Mississippi	61.2	— 3.5	McNeill	90	18	Ripley	30	4, 13	2.75	—1.54	Hazlehurst	6.35	Columbia	0.80
Missouri	49.0	— 6.4	Birchtree	84	23	Louisiana	19	21	5.75	+1.97	Nevada	11.03	Mineralspring	2.25
Montana	44.9	+ 1.0	Lodgegrass, Poplar	88	28	Chinook	— 3	1	0.66	—0.52	Red Lodge	2.43	Plains	T.
Nebraska	45.8	— 3.7	Lynch, West Point	84	29, 30	North Loup	6	16	2.00	—0.51	Pawnee City	7.37	Kennedy	0.15
			Santee	84	30									
Nevada	45.4	— 0.6	Martin's Ranch	97	11	Eureka, Potts	10	1	0.66	—0.16	Austin	1.98	Wadsworth	0.00
						Hamilton	10	19						
						Geyser	19	24						
New England*	41.5	— 1.8	Hartford, Conn	78	25	Van Buren, Me	0	4	5.68	+2.68	Kingston, R. I	9.70	Fort Fairfield, Me	1.35
New Jersey	46.7	— 2.7	Bridgeton	85	25	Layton	16	4	3.42	—0.01	Newark	4.71	Clayton	2.00
New Mexico	53.3	+ 1.5	San Marcial	97	7	Fort Union	14	7	0.15	—0.38	Eagle Rock Ranch	1.13	7 stations	0.00
New York	40.5	— 4.0	Primrose	78	25	Number Four	5	4	3.35	+0.55	Elba, Southampton	7.17	Ticonderoga	1.47
North Carolina	54.8	— 2.9	Tarboro	88	26	Linville	11	21	1.47	—2.35	Bryson City	3.42	Raleigh	0.29
North Dakota	37.4	— 4.0	Wishek	91	30	Milton	2	3	1.70	—0.17	Lisbon	4.18	Bottineau	0.13
Ohio	44.4	— 5.4	Sidney	81	23	Millport	7	14	3.53	+0.66	Wooster	6.59	Toledo, No. 2	1.29
Oklahoma and Indian Territories.	58.7	— 2.4	Mangum, Eldorado, Okla.	100	20	Cleo, Okla	23	16	2.82	—0.47	Cleo, Okla	5.06	Kenton, Okla	0.58
Oregon	51.3	+ 3.3	Alpha, Fairview	94	11	Lakeview	10	23	2.85	—0.48	Glenora	8.75	Butter Creek	0.30
Pennsylvania	44.7	— 3.3	Hanover	86	25	Claysville	9	14	3.45	—0.12	Parkers Landing	6.42	Shawmont	1.34
Porto Rico	74.4	.....	Manati	94	18	Cidra	50	26	5.10	.....	Perla *b*	12.73	Central Aguirre	1.31
South Carolina	59.2	— 3.2	Gillisonville	89	16	Spartanburg	21	5	1.34	—2.30	Liberty	2.45	Charleston	0.17
			Walterboro	89	28									
South Dakota	42.9	— 3.6	Cherry Creek	88	28	Hotch City, Howell	7	16	2.02	—0.75	Aberdeen	6.80	Cherry Creek	0.10
Tennessee	53.4	— 5.1	Dover	84	23	Springdale	17	21	3.26	—0.98	Covington	6.36	Charleston	1.60
Texas	66.3	— 1.1	Comstock	102	15	Tulia	28	9	2.98	+0.20	Galveston	11.04	4 stations	0.00
			Gatesville	102	7									
Utah	48.2	+ 1.0	Hite	94	12, 13	Loa	10	24	0.76	—0.26	Alpine	3.02	3 stations	T.
Virginia	51.4	— 2.8	McDowell, Newport News.	90	26	Hot Springs	11	3	2.32	—0.95	Hot Springs	4.95	Bedford City	0.62
Washington	50.8	+ 2.7	Centralia	92	12	Cusik (Usk), Twisp	17	1	2.19	—0.42	Clearwater	6.60	Sunnyside	0.23
West Virginia	47.7	— 3.1	Moorefield, Nuttallburg.	82	24	Powellton, Terra Alta.	12	4	3.15	—0.31	Powellton	5.71	Marlinton	1.12
Wisconsin	39.4	— 6.0	Brodhead	83	23	Hayward	— 6	16	1.86	—0.80	Medford	3.05	Florence	0.62
Wyoming	41.5	+ 1.4	Hyattville	85	27	Grand Canyon, Yellowstone Nat. Park.	—12	1	1.42	—0.48	Thermopolis	8.27	Fontenelle	0.05

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

frosts thinned the fruit, especially peaches, though apples were not hurt much, and injured truck to a minor extent. Preparations were made for a large crop of cotton. Planting corn became general and some was up. Tobacco plants were small and late. Wheat and oats improved somewhat, but need warmer weather and more rain.—*C. F. von Herrmann.*

North Dakota.—Unusually cool weather prevailed during the forepart of the month, accompanied about the 8th by a severe storm in all sections, except the central and western portions. The melting of this snow, together with that which was already on the ground, flooded most lowlands, making farm work impossible until near the close of the month.—*B. H. Bronson.*

Ohio.—Temperatures were decidedly below normal. Precipitation was somewhat in excess in the northern and middle sections and slightly deficient in southern portions. Excessive rainfall occurred on the 1st. Work was delayed and growth retarded. Wheat was injured by freezing. Winter rye improved. Seeding for oats was delayed. The weather was too cold for tobacco. Fruit prospects were generally satisfactory, although the outlook for peaches was poor.—*J. Warren Smith.*

Oklahoma and Indian Territories.—Cool weather and deficient precipitation retarded development of crops and caused a decline in cereals. Wheat made poor to fair growth, but was in poor condition, and a large area placed to other crops. Oats uneven stand and poor. Corn a fair stand and being cultivated. Cotton coming up to a fair stand. Kafir corn, millet, castor beans, and broom corn being planted. Alfalfa, range grass, fruit, and stock were doing well, but fruit was badly damaged by frosts.—*C. M. Strong.*

Oregon.—First half of month very favorable for all crops, latter half cool and showery. Fall wheat was healthy, well stooled, and growing nicely. Spring wheat, oats, and barley were coming up to good stands. Pastures and stock did well. Goat shearing completed, clip good. Sheep shearing well advanced, with average clip. Gardens were backward. Hops were thrifty. Cherries and Italian prunes were badly damaged in a few localities by frost; otherwise fruit prospect was excellent.—*Edward A. Beals.*

Pennsylvania.—The mean temperature was the lowest for any April in the history of the service (17 years). The precipitation was very unevenly distributed. Conditions were decidedly unfavorable to plowing, seeding, planting, and germination, and the month closed with farm

work and vegetation two or three weeks backward. The consensus of opinion was that a large acreage of winter grain had been killed and that all fruit had been more or less injured, and peaches seriously.—*T. F. Townsend.*

Porto Rico.—Weather generally favorable for all crops. Sugar making continued without interruption and the grade of juice obtained was generally satisfactory. Young canes were in excellent condition. Coffee trees continued blossoming; early blossoms badly injured by the heavy rains of March and the crop will be light. Rice, beans, corn, and cotton planted and some beans and corn harvested. Oranges became scarce. Pineapples and mangoes appeared in the markets. Pasturage was good.—*E. C. Thompson.*

South Carolina.—Steady low temperatures and a deficient rainfall were favorable for planting operations, which advanced farther than usual, but conditions were unfavorable for germination and growth, so that stands of corn, cotton, and rice were generally poor. Cotton planting was nearly finished, but only a small portion came up during the month. The normal development of truck, oats, wheat, and tobacco was retarded. Peaches, apples, plums, and other fruits were not affected.—*J. W. Bauer.*

South Dakota.—By the 30th the seeding of oats and spring wheat was finished in the southern and near completion in the middle counties, and wheat seeding was well advanced in the northern counties, with early sown grain coming up well and the medium late sown germinating favorably. Spelt and rye seeding was fairly well advanced and potato planting and gardening were begun. Grass was very backward, but by the close of the month afforded some grazing.—*S. W. Glenn.*

Tennessee.—The month was generally favorable for farm work, but the low temperature caused poor germination of seeds and slow growth of crops; however, wheat and spring oats improved greatly. Corn and cotton were mostly planted by the end of the month, but were coming up slowly; tobacco plants were small. Frosts during the first three weeks damaged garden crops and fruits, but there was a good prospect for apples, and in some localities peaches promised a fair crop.—*H. C. Bate.*

Texas.—Frequent cool waves occurred during the month, and on the morning of the 10th light frost was reported down to the coast region. The rainfall over the eastern half of the State was well distributed and sufficient to keep the ground in good condition; that over the western half was very light and afforded only temporary relief from the drought that had prevailed over that section for several months. The planting of cotton progressed rapidly and was nearly completed in the eastern half by the close of the month; good stands were generally secured, but the cool weather interfered with growth and the frost of the 10th did considerable damage to plants on lowlands. Corn made good growth and had received its first cultivation. Wheat, oats, barley, and rye made steady improvement, but were still much below the average condition in the western portion. Fall wheat and oats were heading. Rice sowing progressed rapidly and good stands were generally secured. Sugar cane made good growth. Hay and forage crops did well. The fruit crop was promising.—*L. H. Murdoch.*

Utah.—The temperature was slightly above normal, while precipitation was deficient. Farm work was backward until the last week when the weather was favorable for rapid progress. At the close of the month the seeding of spring wheat was well advanced. Beet planting was also under rapid headway. Fall wheat was doing well. Lucerne was generally in good condition and so was fruit. Ranges were good and cattle thriving. Sheep shearing was in progress with satisfactory clip.—*R. J. Hyatt.*

Virginia.—Crop conditions were not satisfactory. The weather was generally unseasonably cool; severe and general frosts in last decade did great injury to fruit bloom, especially peach, pear, plum, and cherry, and to young vines and berries. Preparation of land for spring crop was delayed, and gardens and pastures were later than usual. Winter wheat improved during the month and a considerable acreage of spring oats was seeded. Winter oats were in poor condition.—*Edward A. Evans.*

Washington.—The month was considerably above the average in warmth and scarcely as wet as the average April. Crops made no advancement, and no progress was made in farm work until the warm spell from the 8th to 18th, when all crops grew rapidly and plowing and seeding were rushed. The remainder of the month was showery, so that work was delayed and was too cool for rapid growth. At end of month fall wheat appeared to be in excellent condition.—*G. N. Salisbury.*

West Virginia.—Cold, cloudy, rainy weather prevailed during the month, and killing frosts were frequent. Vegetation made little progress, but plowing was pushed rapidly. At the close of the month, wheat and rye were improving somewhat, and meadows and pastures were making some growth; but little gardening had been done; stock was in fair condition, and had mostly been turned out. Although some early fruit was injured, the prospects for a good fruit crop were excellent.—*E. C. Vose.*

Wisconsin.—Cold and cloudy during first and second decades with rain and snow at frequent intervals, and a severe cold wave on the 16th; decidedly warmer weather during the third decade. Much spring grain was sown during the last week. Winter wheat and rye were injured by alternate freezing and thawing, but improved during latter part of month. Standard varieties of apples, plums, cherries, cranberries, and strawberries wintered well, but blackberries and raspberries, where unprotected, were badly killed.—*W. M. Wilson.*

Wyoming.—By the close of the month plowing and seeding were well advanced or completed over the earlier sections of the State, but hardly begun over the later sections. Grass had made good progress and the range was supporting stock over much of the State. Cattle and sheep were in excellent condition, and losses during winter were unusually light.—*W. S. Palmer.*

SPECIAL ARTICLES.

APPLICATION OF SALTS OF RADIUM TO THE STUDY OF ATMOSPHERIC ELECTRICITY.[1]

By TH. MOUREAUX, director of the observatory, Parc St. Maur.
[Translated by Miss R. A. Edwards.]

In current observations of atmospheric electricity, the value of the potential of the air is generally obtained by means of dropping water. This method, perfect in warm countries, is impracticable in our climate on account of the freezing of the water, the receiver, in many cases, being installed under the eaves of elevated buildings, in a place devoid of means of heating. Attempts have been made to protect the stem of the dropper from freezing, chiefly by means of a covering of wool, or by adding to the water a certain quantity of alcohol or of glycerine; but these means present rather serious difficulties in practise. In fact, the registering of variations of the potential is frequently interrupted in winter, at least during severe cold.

The discovery of the salts of radium by Professor and Mrs. Curie places in the hands of physicists a new method, applicable to all places and in all seasons. Professor Curie having had the kindness to place at our disposal some samples of salts of radium of different degrees of activity, we have successively executed a comparison between them and the water dropper now in use. The method adopted for these experiments is as follows: In a copper disk about four centimeters in diameter and two millimeters in thickness, Professor Curie hollowed out to a depth of half the disk's thickness a cavity 15 millimeters in diameter; at the bottom of this cavity he placed a thin sheet of asbestos, on which was placed a decigram of radium-bearing chloride of barium. A plate of aluminum about 1/10 millimeters in thickness was then carefully soldered to the copper disk, in such a manner as to hermetically seal the capsule thus formed. On the face of the disk opposite the aluminum plate was soldered a copper tube which fitted exactly the ordinary tube of the water reservoir at its free extremity. The value of the potential can then be ascertained as one wishes, either by means of radium or by means of the water dropper at two points as near as possible to each other.

Experiments were made at the observatory of Parc Saint-Maur during the months of March and April, 1903, with this apparatus. Three capsules were studied successively. In one, one of the first samples of radium obtained from Professor and Mrs. Curie in 1899 was used. Its radio-activity was not determined, but the experiment showed that the activity of this salt was not sufficient. In fact, the needle of the electrometer established equilibrium very slowly with the atmospheric potential. Rapid variations, for example, were considerably weakened; moreover, the portions of the registered curve indicated constantly a potential clearly less than that indicated by the water dropper; and, finally, the return to zero was extremely slow. The second capsule contained radium-bearing chloride of barium, of activity 5000 times that of uranium. The curves obtained with this second sample did not differ materially from the preceding; they showed that here also the radio-activity was insufficient to guarantee that the registered values were equal to the real value of the potential near the capsule, and, on account of the slowness of the move-

[1] Annuaire de la Société Météorologique de France, Janvier, 1904, pp. 9–11.